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Agricultural Research Service
Beltsville, MD 20715

U.S. Department of Agriculture
Agricultural Research Service

Advances in Agricultural Technology • AAT-W-19/August 1981

ABSTRACT

This report describes a method for removing the female as well as the male codling moth in the field. This method could be used in a mass trapping program. Various combinations of the synthesized pheromone of the codling moth, *Cydia pomonella* (L.), (*E,E*)-8,10-dodecadien-1-ol, were used with blacklight in BAB and Sectar IO traps in the test area to attract both male and female irradiated moths.

KEYWORDS: Codling moth population monitoring, insect mass trapping, pheromone and blacklight combination.

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Although data for this report were gathered from 1973 to 1975, no subsequent research has duplicated or superseded the original research, which is just as useful and timely now as it was when the study was completed.

A copy of this publication is available from the Yakima Agricultural Research Laboratory, 3706 West Nob Hill Boulevard, Yakima, WA 98902.

International Standard Serial Number (ISSN) 0193-3736

Agricultural Research Service, Advances in Agricultural Technology, Western Series, No. 19, August 1981

Published by Agricultural Research Service (Western Region), U.S. Department of Agriculture, Oakland, Calif. 94612

CODLING MOTH:¹ FIELD EVALUATION OF BLACKLIGHT AND SEX ATTRACTANT TRAPS

By Darrell O. Hathaway²

INTRODUCTION

The codling moth, *Cydia pomonella* (L.), is the primary insect pest of apples and pears throughout the world. Populations of codling moth must be monitored so applications of chemicals can be timed and the pest can be surveyed and studied in the field. Geier (4)³ found that a significantly greater number of young codling moth females were attracted to mercury vapor lamps than to bait traps. He concluded that many female codling moths are not attracted to baits until after some of their first-laid eggs have hatched. Gehring and Madsen (3) found that the majority of females attracted to a 15-W blacklight were in a early stage of reproductive maturity. Also, the wing trap (8), the BAB trap (2), and the Zoecon Pherocon 2® trap (previously the Sectar I® trap) have been used as standard traps to survey the codling moth. Butt et al. (2), however, showed that the pheromone in the uncovered wing traps deteriorated more rapidly than did the pheromone in the BAB trap because the wing trap is exposed to sun and rain but is protected in the BAB trap.

Field tests were therefore conducted with the BAB pheromone trap and the Pherocon 2 trap baited with 1 mg of the synthetic codling moth sex pheromone, (E,E)-8,10-dodecadien-1-ol (Codlure) (1, 9, 11), and/or blacklight. The results of trapping both females and males as a method that can be used in mass trapping are reported here.

PROCEDURES AND TESTS

The studies were conducted in a 0.8-ha laboratory orchard of 12- to 14-year-old Golden and Delicious apple trees planted in a 6- by 6-m square with a grass cover plot from June 18 to September 14, 1973; from June 10 to August 29, 1974; and from June 20 to August 14, 1975. The experiment consisted of four treatments with three randomized replications. The treatments were (1) Pherocon traps baited with 1 mg Codlure; (2) BAB traps baited with 1 mg Codlure; (3) BAB traps baited with 1 mg Codlure and blacklight; and (4) BAB traps baited with

¹*Cydia pomonella* (L.).

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³Italic numbers in parentheses refer to Literature Cited, p. 3.

blacklight only. The traps were hung about 2 m above ground level on the north side of the trees. The Codlelure was impregnated on separate rubber sleeve stoppers, and freshly impregnated stoppers were put out once each month.

The test insects were codling moths that had been reared at Yakima on immature apples (5, 6, 7), sterilized with 30 krad of gamma irradiation (14), marked with fluorescent powder (10), packaged in 470-cm³ paper cups, and released by placing the cups at random locations and removing the lids. The sex ratio of the released moths was about 1:1 in all 3 years, and the numbers released in 1973, 1974, and 1975 were 6,500, 12,000, and 18,500, respectively. In 1973, the treated moths were released at six locations one tree row away from each trap; in 1974 and 1975, the releases were made at the base of each tree in which a trap was located so as to have an equal distance between all release points and traps. The treated moths were usually released in lots of 1,000 to 1,500. For example, in 1973, lots of 1,000 mixed moths were released June 16 and 23 and August 8, 14, and 21; a lot of 1,500 was released July 31.

RESULTS AND DISCUSSION

During the 3-year study, the BAB trap baited with 1 mg of Codlelure consistently caught the most moths (table 1). The second largest number was taken in the BAB trap baited with pheromone plus blacklight. The Sectar I trap baited with the pheromone was third, and the BAB trap baited with blacklight only was fourth. The BAB trap plus pheromone was significantly superior to the Sectar plus pheromone 2 out of 3 years.

Table 1.--Number of codling moths captured in traps baited with either synthetic pheromone (Codlelure) or blacklight separately or in combination, Yakima, Wash., 1973-75

Treatment	No. of male and female moths captured ¹						Total 1973-75
	1973 ²		1974 ²		1975 ²		
	♂	♀	♂	♀	♂	♀	
Sectar I + Codlelure	818 a	0	486 a	0	1,304 a	0	2,608
BAB + Codlelure	779 a	0	1,747 b	0	2,521 b	0	5,047
BAB + Codlelure + blacklight.	734 a	49	1,467 b	27	2,176 b	76	4,377
BAB + blacklight	337 a	45	753 a	21	1,090 a	66	2,108
Total	2,668	94	4,453	48	7,091	142	

¹Means followed by the same letter are not significantly different at the 5 percent level by Duncan's multiple range test.

²6,500 marked mixed sex insects were released in 1973, 12,000 in 1974, and 18,500 in 1975.

The positive effect of adding blacklight to the bait was to attract females. About the same number of female moths were caught in the BAB trap baited with blacklight alone as in the BAB trap baited with blacklight plus pheromone. The BAB trap baited with pheromone only caught the largest number of male moths, but caught no females. For monitoring or surveying, it can be advantageous to capture female moths because they can be dissected to determine whether they have mated. This information is valuable when studying the control of codling moths in an orchard by means of mating disruption.

CONCLUSIONS

The BAB traps used were modified to include the blacklight and were less expensive than the standard blacklight traps though they caught fewer females. The reason so few females were caught in the modified BAB traps, was probably because of irradiation damage. White and Hutt (12) and White et al. (13) showed that the vigor of female codling moths is impaired by treatment with 25 or 40 krad gamma irradiation. The removal of even a part of the female population is a very important factor to be considered when planning a mass-trapping program to remove males.

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